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1

The Promise of a Green Energy Economy

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Why a Green Energy Economy?

The role of the green energy economy in discussions of potential energy futures has steadily grown. The increasing awareness of—and importance given to—this option is exemplified by the United Nations Conference on Sustainable Development (UNSCD),which convened in Rio de Janeiro, Brazil, from June 20 to 22, 2012, where realizing a new economy fueled by green energy was identified as an essential prong in any strategy to alleviate worldwide poverty and promote sustainable development.[1]

The opportunity—and need—to transition to a new economy is highlighted in current economic- and climate-change challenges.[2,3] The worldwide economic problems since 2008 underscore the need for a shift to alternative development pathways. A major case can be made for the green energy economy as a means to move away from current hardships, while providing methods of reducing dependence on finite energy resources as well as mitigating risks and harms associated with conventional energy sources such as climate change. The consequences of fossil-fuel use in terms of environmental and human-health effects are substantial. For instance, Epstein et al.[4] estimate that the life-cycle social costs associated with coal use are between 10 and 28 cents/kWh. The low estimate of 10 cents/kWh corresponds to a cost of $700 billion annually. In short, transitioning away from the use of fossil fuel sources can further increase national income and prosperity by lowering the burden on healthcare services and environmental costs. While the scale and complexity of such a transition are daunting, many benefits can be accrued from a successful shift.

One of the major benefits can be rapid and broad-based job creation. The Energy Information Administration (EIA) forecasts that world energy consumption will increase by 53 percent between 2008 and 2035.[5] In order to provide the necessary services on the basis of such forecasts, the modern energy paradigm focuses on increasing the use of conventional energy sources. Expanding and updating coal generation capacity has typically been the means of meeting the rising energy demand. Within this paradigm, there is an incentive for utilities to sell more, rather than less, electricity. While this approach might satisfy prevailing demands in the short run, it does little for long-term structural economic change or employment prospects. In fact, for every million USD invested in supplying fossil-fuel-based services, only four permanent jobs are created.[6] Given the same level of investment, the number of permanent job increases is estimated to be three times higher when priority is given to photovoltaics (PV) and other renewable energy installations, and grows by a factor of four when resources are dedicated to the use of information and communication technology (ICT) for a smarter electricity grid and more intelligent transport.[7,8,9] Additionally, every million USD invested in energy efficiency and conservation projects creates between twelve and fifteen permanent jobs.[10] Green energy technologies—PV, wind, ICT, energy efficiency, etc.—offer a development pathway that is less fuel-intensive while requiring deployment of more human resources to build the transition. Such a pathway can substantially improve employment opportunities in the near term while enabling the change in energy infrastructure necessary to solve enduring threats of climate change and energy poverty (i.e., the large unmet needs of a large proportion of humanity living in the light shadow of industrialized economies).

Investment in a green energy economy can potentially establish the infrastructure of a new paradigm. While the modern energy paradigm relies on the "more is better" principle of development at the core of decision making, the new paradigm will focus on providing energy service needs while using far less energy. This means a new paradigm in which a narrative of "just sustainability"[11] is at the core of decision making. Using fewer resources is hardly a recipe for social decline. In fact, research has shown that the "negawatt"[12] (i.e., not consuming energy) in most cases costs one-half or less of the US price of retail electricity.[13] Moreover, the high conversion and distribution losses associated with conventional energy production and consumption underscore the costliness and long-term risk of the energy status quo: every unit of end-use electricity saved through efficiency measures avoids production/consumption of three units of primary energy.[14] The infrastructure of a green energy economy not only improves employment opportunities but also provides the same energy services to consumers with fewer resources so that social opportunity expands into the future. This is in marked contrast to the prevailing order whose use of more energy, drawing from non-renewable sources, can only promise higher costs and widening energy poverty. In brief, investing in green energy negawatts and renewable energy as a global strategy not only mitigates climate change (due to the use of fewer energy resources and, as a result, the release of fewer emissions) but also strengthens the resilience of economies throughout the world.

Of course, a transition to a green energy economy necessitates a substantial increase in production and consumption of certain things, for example, solar cell modules, wind turbine nacelles, and fuel cells. Some wonder whether this is realistic in terms of the scale, complexity, and needed level of commitment. A rapid shift from fossil-fuel resources toward a green energy economy can be accomplished on a timescale that is constrained only by the political will to realize the good. As Lester Brown notes, the shifts in engineering, manufactur-ing, and ways of daily life associated with the communications revolution of the last thirty years redefined the economic, cultural, and political ties of billions of people.[15] The internet and mobile-phone infrastructures are examples of real-time rapid transformation that should warn skeptics who doubt the pace and scope of paradigm shifts.

Several countries recognize the promise of a green energy economy and are creating incentives to ensure that they are manufacturing tomorrow's energy devices. China's development strategy is an example: between 2006 and 2008, world solar cell production increased by 2,400 MW. In the same period, China expanded its share in the production of solar cells from 11 to 60 percent.[16] Considering that the "green shift" will mean the production of thousands of gigawatts of solar and wind energy, China has positioned itself as a key designer and producer of the new era.[17] Notably, countries committed to the production of new technologies will benefit not only their manufacturing industry—and thus, support their domestic job market—but also their national income and export prospects, and their ability to shape further innovation.

Driven by a technological paradigm of "more is better," the modern energy system requires vast amounts of fuel to function. A parallel economic paradigm of "cornucopian"[18] development completes the modern model of growth without limits. But the model has inescapable contradictions, which are especially evident in the contemporary period. One is political: when a society needs fossil-fuel imports to power its success—and the cornucopian impulse destines *all* moderns to eventually need imports—a political paradox is revealed. Smaller countries must sacrifice a measure of endogenous political control, while larger ones, not withstanding declarations of preference for democratic politics, quickly seek energy hegemony. Additionally, modern society—small or large—must embrace an environmental contradiction: the idea of "normal pollution."[19] Treating its natural surroundings as incidental to economic and energy needs is part and parcel of modernization. Spending the profits of economic growth on cleaning up (the premise of the "environmental Kuznets Curve")[20] will not erase the contradiction: as the ability to clean-up improves, the ability to risk more environmental calamity expands.[21] The destiny of such a way of life is ever-expanding political and environmental insecurity.[22]

In contrast, green energy strategies use domestic energy resources, such as solar irradiation, reduce the length of the supply chain and can lower the risk of political dependence, security conflicts, and environmental harm. For this reason, a green energy economy can empower a politics controlled by domestic goals rather than international conflicts.

The "green shift" can also help in mitigating many of the environmental risks that we currently treat as inevitable. For example, energy and carbon obesity are interlocking features of the contemporary pursuit of happiness.[23] Moderns are busily working on "green titan" strategies that can lower greenhouse gas emissions while fueling relentless economic growth,[24] as though the cure for obesity is a greening of the unhealthy condition. If greenwash is to be averted, the new economy needs to enable a genuinely new direction, which we propose is a recovery of the commons foundation of economics. The "green" in the new economy is to be found in the energy commons of all economic activity. We will discuss this challenge below. But first, we would like to examine how and why what could be a solution to our problems has been resisted so strenuously for so many decades.

The Political Economy of Energy Transitions

A green energy economy could offer a considerable contribution to our problems. Its promise has been noted for at least thirty five years, since Amory Lovins mapped the "soft energy path."[25] Considering its known, significant potential compared to the contemporary "hard path"[26] regime, proponents of change understandably regard the choice as obvious and the case for transition as plain. In essence, this position argues that the intrinsic qualities—from job creation, emission reductions, and energy security—are sufficient to engender the needed social change. The premise is that the green energy economy is virtually self-implementing. After waiting so long for a self-implemented soft path, we might finally reconsider the premise.

One factor in, if you will, the "blindness" of new economy advocacy is that it sees change via the lens of "technological niche"[27] in which new techno-logical capabilities and their potential benefits impel change. This perspective neglects the wider context of meso- and macro-level forces of order and change. The larger context, which includes macroeconomic considerations, macro-level political developments, cultural preferences, and the overall exogenous envi-ronment, offers a relationship dynamic that needs to be incorporated in any argument for social change.[28,29] The overall structure of relationships between energy producers and consumers, the alignment of political and economic power, and the institutional, legal, and policy frameworks are considerations that can accelerate or inhibit social change, despite potential benefits or disad-vantages of such change. In the evaluation of alternative energy futures and the promotion of change toward such futures, the structure of social valuation— the social dynamic that directs actions and establishes goals based upon its evaluation of their merit—is an essential element for analysis. In this vein, the key question that needs to be asked is the following: how does the structure of social valuation direct energy development and evaluate alternative energy futures?

At its core, the valuation of action and the setting of goals or targets are produced by the existing political and economic architecture. This architecture does not simply exist—it is powerful, setting the context in which decisions about energy at every level (individual to national, policy to market, environment to social) are made. This architecture produces and favors certain decision-making criteria that are aligned with the technological "paradigm of governance"[30] revolving around "more is better" and as such, contains an "institutional bias"[31] toward technology, efficiency (measured in the context of the prevailing architecture)[32], and market-based solutions (where "markets" are referring to the ones that exist). Alternative energy futures, therefore, are evaluated in light of—and much more importantly, in *terms* of—the current energy regime. When reflected upon from this vantage point—and especially when reflected against the criteria for decision making set by the existing energy regime—an alternative energy future such as a green energy economy represents a fundamental shift from the current architecture. Currently, powerful political and economic actors that thrive within the contemporary energy regime perceive such social change as a costly threat—both in political and economic terms.[33] As such, when understood as a problem of political economy, the structure of social valuation in place in the contemporary energy regime clarifies that the transition to a green energy economy will not occur simply because of the recognition of its potential social, environmental, or economic benefits.

The structure of valuation that shaped the technological paradigm of "more is better" puts in place a conservative tendency—a "dynamic conservatism"[34]—as it regards change as a threat to its stable state of energy production and use. The key characteristic of this tendency is that alternative futures are reflected upon from the vantage point of the stable state (i.e., the current energy regime). Strategies of change—such as a pathway toward a green energy economy— are, thus, allocated the burden of change while potential costs of inertia are neglected or justified as the proper charges to an alternative for seeking change. Therefore, aspects of proposed strategies of change that are acceptable to the current political and economic paradigm are likely to agree with the fundamental characteristics of the contemporary energy regime. For instance, as noted by Leigh Glover,[35] the renewable energy discourse has transmogrified itself from a narrative of local counter-strategy to one of behemoth corporate enterprise. In fact, any change that attempts to break away from the current dominant en-ergy regime but remains subjected to the same structure of social valuation that shaped the current dominant energy regime in the first place is more likely to be recognized by its similarity to the contemporary structure than by its differences from the structure.

Positioning the demand and need for social change as, in fact, a "consequence" of the stable state rather than a threat that arose independently from it, alternative energy futures should challenge the role of social arbiter currently awarded to the technological paradigm of "more is better" and aim to reshape the social dynamics and its outcome. The challenge represented by a green energy econ-omy needs to distance itself from the technological and institutional landscape of society, presenting a new meta-narrative that reconstructs our problems as the consequences of business as usual, and our alternatives as those that can break away from business as usual. When the challenge is successful, alternative energy futures will be evaluated against a new foundation of social valuation with associated conditions of political economy.

The reconstruction, however, is substantial. Through economic and technological renewal, the contemporary economic and political system aims to sustain and perpetuate itself along the firmly established "more is better" principle. As a result, social values and priorities will work intensively on finding efficient technological solutions that serve to maintain the stable state, and consequently, position energy development on a fixed trajectory. The term "paradox of innovation"[36] captures the problem in practical form: technological development is a double-edged sword of potential sustainability but also un-sustainability. Continued focus on technological development along decision-making criteria that caused our currently unsustainable energy system to be powerful might "lock-in" an undesired development trajectory. The notion that the continued focus on efficiency in the context of the prevailing architecture and technological innovation (rather than structural social change) might re-enforce the fundamental path-dependent dynamics of society rather than alter them,[37] which reinforces the power of the existing energy regime, making a shift to a fundamentally and structurally different direction increasingly more difficult.

The menu of social change often offered by the existing regime is limited to internalization into the market structure of environmental consequences, end-of-pipe technological development, and institutional reforms that maintain the technological paradigm currently employed by modern society. In effect, this menu directs its attention to the outcomes of social dynamics, rather than the widening conflicts of those dynamics, in an effort to maintain and perpetuate an ever-expanding energy production and use system. For instance, the valorization of ecological services through the establishment of a carbon tax or cap and trade mechanism aims to sensitize social dynamics to ecological stress but fails to explicitly address the meta-narrative and ideology that support high-carbon life as an emblem of social and economic success.

A successful challenge to the existing energy political economy will need to reposition the dynamic relationships among social actors so that transformative social change is possible. Transformative institutional change requires ideas, propositions, and actions that aim to establish a new context of political economy. Falling outside the box of contemporary "energy obesity"[38] offered by the modern cornucopian political economy fueled by "abundant energy machines,"[39] such efforts form the initial conceptualization and implementation of a new context. Supported by the realization that energy and carbon decouple from human needs at higher living standards,[40] these efforts offer the possibility of a menu of social change, which recognizes that more is not *necessarily* better.

Accelerating the Transition

Successful energy transitions have taken decades to centuries to complete.[41,42] Considering the implications of climate change, worldwide poverty and inequality, and dependence on finite fossil fuel reserves, we are searching not only for a transition but one that can unfold more quickly than any transition in the past. In this vein, we put forward here a practical proposition already put into action in the United States and which has, subsequently, gained traction in parts of the United States and internationally. We link the paradigm embedded in this approach to a realignment of social dynamics in local energy development. These efforts can be seen as strategies to redefine the context of political economy in which alternative energy futures are evaluated and implemented.

Institutionalization of Sustainability at the Local Level

Twentieth-century energy utilities institutionalized social action to *supply* rather than *match* needs.[43] Leading energy institutions currently measure their success by the amount of cheap energy they can provide. The technological risks, environmental consequences, and social inequity associated with this energy obesity model of abundant energy machines expose the urgent need for change and can be the starting point for redirecting efforts to *match* rather than *supply needs*. An example of a new institutional approach that contests the "more is better" ethos and supplants it with a new context is the Sustainable Energy Utility (SEU), which is already in action in parts of the United States and being put forward in a growing number of communities in and beyond the United States.[44,45]

At its economic core, the SEU uses future savings from investments in grid-use reduction in order to underwrite investment in sustainability. Instead of a mindset of expansion and growth, the SEU incentivizes reductions and savings by establishing the framework for aggregating community desires to use less in low-risk financing for grid-use reductions, offering the estimated energy savings as collateral. The SEU, thus, transforms energy–environment–society relation-ships by enabling society to use less energy and to deploy renewable energy to meet the remaining energy demand. The SEU positions itself as a practical tool that celebrates—and excels within—the new paradigmatic context of a green energy economy.

The SEU essentially ties the community demand for green energy to its "supply," enabling energy service companies (ESCOs), public agencies, community organizations, and businesses to save energy, install renewable energy, and incorporate long-term considerations into decision making. In order to attract the required financial capital to implement the grid-use-reduction measures, the SEU bundles its projects together and applies its financing (including bond-issuing) authority to scale up a sustainable energy infrastructure. The potential of this mechanism became clear when the Delaware SEU's inaugural bond issue, on August 1, 2011, offered a $67.4 million revenue bond issue and was oversold in two hours. [46] In fact, the rapidity with which investors subscribed to the bond—quickly oversubscribing nineteen of the twenty-three serial bonds—generated a premium in excess of $5 million.[47] The potential of the SEU bond issue mechanism—and the model of this new utility—as a viable strategy to establish a context of energy conservation, and renewable energy development that can support transformative social change became clear. Touching only 4 percent of Delaware's state-owned/managed buildings owed, the offering is generating $148 million in money savings against total costs (including debt service) of $110 million—a 25 percent effective rate of return. The sovereign pledge to pay energy bills, which are *guaranteed* to be over 22 percent lower, earned the SEU's bond issue an AA+ rating from Standard & Poor's. This use of the public replaces the twentieth-century model in which such a promise securitized the investor-owned utility's economic health with a new strategy of prioritizing public purposes—improving ecosystem health, stimulating local economic development, and restoring social governance of the energy sector—and inviting investors to compete to fulfill these promises.

The promise of the SEU has rapidly attracted wider attention. While first implemented in the US state of Delaware, additional SEUs have been established in Washington DC, and variants of the model are at work in Vermont, Connecti-cut, and Oregon. Sonoma County Water Agency, in California, is pursuing a $30–$50 million sustainable energy bond program for schools, hospitals, and municipal buildings.[48] The concept has been recognized by the White House[49] and the Asian Development Bank,[50] and the implementation of SEUs is being explored internationally.[51,52,53]

A measure of the model's transformative power can be obtained by considering a nationwide initiative to improve performance of the equivalent of 4 percent of the floor area of state public buildings throughout the United States. This would represent, in a *single* transaction (available for use year after year) an investment of more than $25 billion, creating 300,000 jobs, and lowering public sector carbon emissions by as much as 10 percent. A study of its use *only* for federal facilities concludes that the model would outperform the US government's Energy Service Performance Contract Program by a factor of six and save taxpayers $500 million.[54]

A Reorientation of Policy

The institutionalization of sustainability in the form of energy conservation and renewable energy investment is one aspect of a new menu of social change. Other conditions of political economy such as power, policy, and legal frameworks also need to be comprehensively incorporated in strategies of social change. Regarding policy, it is important to note that no "one-size-fits-all" is possible. But growing evidence exists that the deployment of renewable energy in countries that are leading in terms of installations depends on policy support.[55] As such, while the institutionalized approach of the SEU fundamentally reframes the energy–environment–society relationship and thus represents a significant departure from the modern energy paradigm offering substantial potential for the realization of a new green energy economy, several policy mechanisms and ideas need to be considered in any common effort pursuing a sustainability-based future.

Most national and lower levels of government with a modicum of success in installing renewable energy employ a policy mix of various subsidies, specific commitment percentages, and targets, and offer purchase guarantees. Germany, for instance, has a twenty-five-year policy history of promoting photovoltaic use and is now the global market leader in terms of installations with 3.8 GW—representing 4 percent of the global electricity generated from renewable energy.[56] Germany's efforts in the feed-in tariff policy[57,58] coupled with low to no interest financing and subsidy support for installation costs has boosted the country ahead of others, and perhaps not unrelated, coincides with Germany's status as one of the strongest economies in Europe. Leading by example, Germany's efforts are now copied and applied by several other countries.[59]

In the United States, investment tax credits, production tax credits, and accelerated depreciation tax incentives form a national renewable energy policy context. The federal government so far, however, has not established a consistent and effective policy framework for renewable energy and climate policy. As a result, the United States has been the target of criticism from those seeking stronger climate commitments from a leading world economic power. At the same time, despite disappointing federal efforts to date, local and regional policy efforts in the United States show a strong commitment to renewable energy and climate change mitigation and surpass—both in terms of quantitative and qualitative goals and actions—the federal commitment.[60,61,62,63] The American renewable portfolio standard (RPS) and regional cap and trade policy frameworks are examples of policy tools that have been implemented by lower levels of government in the United States in the absence of a larger coordinating federal narrative. Thirty-six states and Washington DC have committed themselves to an alternative energy future, as they have passed RPS legislation enacting the promise to implement increasing shares of renewable energy in the energy mix.[64]

The US bottom-up discourse represents a paradigmatic move away from conventional conceptualizations of effective climate and energy policy that focus on (inter)national articulations and instead, offers a "direct democracy" pathway for civil society to apply its political voice regarding the direction and narrative of US energy and climate policy.[65] Thus, local, participatory, and accountability-based action interjects democratic considerations into the overall decision-making process allowing for a shift toward new ideas and experimentation of new, transformative political propositions. Lower-level experimentation and innovation with these policies—the RPS is only one of the many policies that have been enacted at the state level[66] —offers a dynamic platform for new ideas and propositions that can circumvent the gridlock of the national political economy. Federal-level inertia can thus be overcome by direct articulation of commitments to the green energy economy.

Repositioning the Social Dynamic—The Community as the Building Block of Change

A final example of how the conditions of political economy can be incorporated in the proposal of an alternative energy future and how social dynamics can be realigned to design and reinforce this future is the community solar discourse. Recognizing the limited power of individuals to capitalize on the benefits of solar technology—primarily due to high upfront investment costs—a commu-nity solar discourse repositions this social dynamic away from the individual toward community networks. Individual consumers purchasing solar technology from the market face substantial barriers such as information gaps (e.g., where to buy solar technology, which technology is most suited for my needs, etc.) and high initial upfront costs. Through an aggregation of individuals into a community-based effort for the purchasing of solar energy (rather than simply the purchase of technology), the social dynamics between the consumer and producer change. A community-based effort, for instance, is able to capitalize on economies-of-scale thereby negotiating lower prices for the bulk purchase of goods; it can navigate the policy and legal maze more effectively owing to the pooling of knowledge and resources, and it allows for resources to stay within the community rather than having resources flow to large-scale utilities. There are a host of practical mechanisms to accomplish this aim (including power purchase agreements, municipalization of power delivery, etc.). The key factor, though, is the shift from a technical administration of a community's energy destiny to an institutionalization of community governance of its future. The SEU model is designed to express this aspiration.

A community-based SEU essentially shifts the decision-making dynamics away from the political economy of centralized utilities and formulates a new context of community articulated and long-term energy development priorities, objectives, and needs. A greater decentralization in the electricity sector—particularly when performed with renewable energy—through the development of community-owned energy projects allows more active[67] and effective participation in decision making by individuals and community groups.[68] Furthermore, a community-based approach offers many social and economic co-benefits such as local economic development, local job creation, energy infrastructures that can be changed as community objectives change, and community-designated environmental and governance goals (which likewise can change through participation rather than the prevailing model that pits communities against experts in contests of technical acumen, ironically paid for by community members).[69,70,71]

A combined dynamic of institutionalization of sustainability and policy experimentation and innovation offers the potential of a commons-based approach to energy development that recognizes and values long-term ecological considerations that are currently neglected by the conditions of political economy. The social innovation of the SEU offers, through the institutionalization of sustainability, a pathway of actual energy saving beyond the rhetorical recognition now offered with realized savings as a share of sales averaging an embarrassing 1 percent.[72] The paradigmatic shift in energy and climate change policy away from failed top-down policy to bottom-up initiatives allows for civil society engagement in the formulation of the vision of social change and a circumvention of the lobbying power of centralized energy's defenders at the national level.[73] Finally, the community-solar approach is an example of a repositioning of social dynamics—from the individual consumer to the perspective of the community landscape inhabitant—that offers power to outline energy development to the community. The continued expression of—and experimentation with—such new transformative social innovations and ideas offers a pathway of strategic social change that positions livelihood-centered energy and economic develop-ment and participatory governance at the center stage in the pursuit of the green energy economy. Such strategic social change can then be positioned as a more appropriate picture of social change—a "social change 2.0"—as it focuses on the implementation of transformative social innovations, a collaborative playing field, the empowerment of people, the transformation of dysfunctional social systems, and the expansion of social innovations at larger levels of scale.[74]

Conclusions

Energy decisions are entangled in large-scale infrastructures, sometimes influencing their evolution, and later, depending upon these infrastructures to pursue different objectives. With age, these infrastructures and the decision making that depends upon them seem inevitable, even essential, and in this way become barriers to, and possibly preclude rapid transformative change. For instance, our current built environment has become difficult to change given policy and economic priorities that emphasize short-term gains, fast construction, and low-cost finance.[75] The inevitability of our built environment, however, is ephemeral when one considers that many new buildings will be constructed, many more will be renovated, and still others will be demolished. This turnover could offer an opportunity for a new era of sustainability, which could, in turn, motivate momentum toward "sustainable cities". The next generation of buildings, then, take into account long-term considerations, minimize energy use, and generate (a portion of) their own energy. This is an exceptional opportunity to change the future spaces where we will live and work—that is, to increase indoor air quality and sunlight exposure while reducing the environmental effects of wasteful fossil and nuclear energy consumption and overuse of water. In effect, a new policy and institutionalized direction for the built environment—and for all other sectors of the economy—can position the principles of sustainability and equity at the core of decision making.

Energy must inevitably be used, even if nothing is wasted. With considerations of climate change and other social and environmental challenges in mind, this energy must increasingly come from renewable energy sources. In addition to energy-saving measures, smart use of these energy sources will substantially decrease the pressure on the environment while providing many social bene-fits. The prices of coal, oil, and natural gas show—despite concerted efforts to maintain a steady and low price—a high volatility and an overall rising trend.[76] In contrast, renewable energy sources benefit from rapid technological improvements, increased economies of scale, and manufacturing experience. As a result, these technologies experience rapid growth: the PV industry market demand has expanded at an annual rate in excess of 40 percent.[77]

In effect, the new policy context of energy productivity conservation and renewable energy represents a paradigm shift from the "|more is better" principle toward a foundation built on enjoying less. Such a paradigm shift fundamentally re-arranges the energy–environment–society relationship as the policy frame-work concentrates on efforts to fulfill human needs and wants. Such a paradigm prioritizes the *energy service needs* of society and attempts to fulfill these equitably and sustainably. This chapter has elaborated on the concept of the SEU as a practical tool for actively focusing on *matching energy supply to the needs* of participants rather than *supplying the needs* with ever-expanding energy.[78] The evolution of energy and climate policy in the United States through a bottom-up discourse offers the potential to circumvent entrenched conditions of political economy and allows for the more direct input of civil society to formulate action. Similarly, efforts to build community-scale solar systems could offer a pathway to capitalize on the promise of the green energy economy by repositioning social dynamics from the consumer–producer relationship to the community–producer–user relationship. These initiatives, however, require thinking and action, which departs from an incremental model of cost and benefit built on the premise of the inevitability of the status quo. In brief, paradigm change, not merely improvement in economics of sustainability, is needed.

A green energy paradigm is a means of transformation, enabling society to author a different future. This requires an understanding that nothing is inevitable as well as actions that create new institutions such as SEUs to empower deci-sions on behalf of a sustainable and equitable future. Rather than perpetuating the oxymoronic pursuit of endless growth with finite fossil resources, the green energy economy requires implementing energy systems that utilize natural and renewable capital and reduce the overall pressure on the environment through a significant dial-back in energy use. For more jobs and economic prosperity in the short run as well as sustained economic and ecological well being in the future, it is time we make energy infrastructural investments and decisions that will provide us with a safer, cleaner, and more equitable way of life—a green energy economy.

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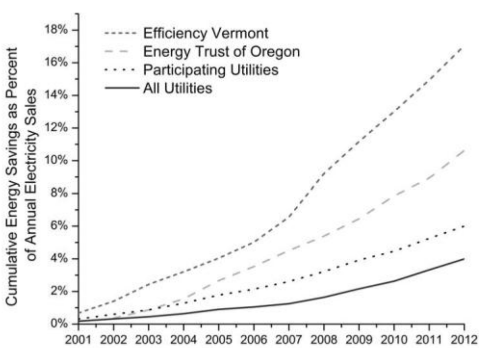
72. The graph below presents the cumulative energy savings of several third-party energy efficiency utilities compared to regular utilities. It demonstrates how regular utilities realize much lower energy savings over time. The graph is taken from Byrne, John (2012). Presentation to the 2012 ARPA-E Energy Innovation Summit: The Future of Energy Efficiency Finance. Washington, DC.

Figure 1

Compared Cumulative Energy Savings between Various Energy Utility Models



73. One diagnosis of the failed Kyoto process is the inordinate power of centralized energy at national political scales, while local politics is often less prone to takeover by energy elites. See, for example:

    See Note 60 and Sanya, C., and Browne, T. R. (published online). "Innovative US Energy Policy: a review of states' policy experiences," Wiley Interdisciplinary Reviews: Energy and Environment. http://dx.doi.org/10.1002/wene.58.
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